

Melting Ice Caps

(By Sienna, Christiane and Erin)

**Definition:**

A polar ice cap is a region of land at the North or South Pole of a planet that is covered with ice. Earth is not the only planet with polar ice caps - Mars also has them, though they are mostly frozen carbon dioxide.

The melting of the polar ice caps is caused by the overall increase in global temperature, and this melting can have serious consequences for all organisms on Earth. Besides being important for marine life, ice caps help regulate sea level and global temperatures.

**Why are they important?**

* It reflects sunlight

Sea ice is white, so it reflects most sunlight back to space. This reflectivity, known as "albedo," helps keep the poles cold by limiting heat absorption.

* It limits severe weather

It's well established that global warming boosts severe weather in general. Sea-ice loss favours bigger storms in the Arctic itself. As sea ice dwindles, ocean waves can grow larger.

The substantial weight (one ton per cubic meter) of glaciers exerts enormous pressure on the earth, thus suppressing earthquakes. According to NASA, when this pressure is reduced, many geologic reactions, such as earthquakes, volcanic eruptions and tsunamis can be triggered. This is because the tectonic plates become free to move against one another.

* It supports native people

“Shishmaref” (village in Alaska) is an extreme case, but its residents aren't alone in watching their home crumble.

* It protects wildlife

Example: Polar bears rely on ice as a habitat. Disappearing ice means more time spent in the water, and this means more difficulty hunting.

**Causes of Melting:**

The main cause of melting ice caps is warmer temperatures, also called climate change. This can be caused by greenhouse gases trapping in the sun’s heat. These gases include carbon dioxide, methane, water vapour, ozone, and nitrous oxide. When the sun’s heat strikes the earth’s surface, it does not get reflected back into the atmosphere, but rather gets trapped and heats the planet.

Greenhouse gases are emitted in many different ways, including through the industry like factories, burning fossil fuels and transportation. Other factors such as deforestation have added to the problem. Trees soak up Carbon dioxide, one of the greenhouse gases, from the air. Fewer trees, especially in the tropics, means less CO2 is removed from the atmosphere.

**Effects/Consequences of Melting**

**How does this dramatic ice melt affect the Arctic?**

The melting of once-permanent ice is already affecting native people, wildlife and plants. Polar bears, whales, walrus and seals are changing their feeding and migration patterns, making it harder for native people to hunt them. And along Arctic coastlines, entire villages will be uprooted because they're in danger of being swamped. The native people of the Arctic view global warming as a threat to their cultural identity and their very survival.

**Will Arctic ice melt have any effects beyond the polar region?**

**People and places**

The worst effects will be felt by those that are coastal and low-lying (at greatest risk of flooding) and the poor and highly populated (lacking a capacity to cope).

People can lose their homes, coasts will be flooded and there will be erosion (because of an increased amount of water constantly splashing against the rocks). Rising sea levels threaten low-lying areas around the globe with beach erosion, coastal flooding, and contamination of freshwater supplies.

An example of islands at risk is the Maldives, which will eventually disappear completely if global warming is not fixed. Most of the tiny islands that make up the Maldives are less than two meters above sea level. The 300,000 people that live there may soon become refugees, victims of climate change. In 2008, the Maldives President asked neighbors India and Sri Lanka if he could buy some of their land.

Rising seas would severely impact the United States as well. According to a 2001 U.S. Environmental Protection Agency study, this increase would flood some 22,400 square miles of land along the Atlantic and Gulf coasts of the United States, primarily in Louisiana, Texas, Florida and North Carolina.

**Effects on wildlife**

A common example of climate change’s negative impacts is on polar bears. It is on the Arctic ice that the polar bear makes its living, which is why global warming is such a serious threat to its well-being. As climate change melts sea ice, the U.S. Geological Survey projects that two thirds of polar bears will disappear by 2050.

Different types of other species are at risk as well: rising temperatures are already affecting Alaska, where the spruce bark beetle is breeding faster in the warmer weather. These pests now sneak in an extra generation each year. From 1993 to 2003, they chewed up 3.4 million acres of Alaskan forest.

Another example is vanishing coral reefs: corals require sunlight for photosynthesis to survive and thrive but as the sea level rises, insufficient the not enough sunlight can reach the corals. This will cause the corals to deteriorate and, eventually, die. Many marine species that depend on the corals for food will also die, or even become extinct. Thus, the entire ecosystem is hurt.

**Global Warming and the Polar Bears**

The melting of polar ice caps caused by global warming have significantly altered the polar bears life habits. In 2002 the Ward Hunt Ice Shelf, which has been in the Arctic for 3,000 years, split in half. The shelf continues to break into smaller pieces. This shelf is also home to the polar bears of the Arctic. Because the shelf has split into multi sections, the polar bears now have a smaller area to survive. This includes a limited food supply. Polar bears are being forced to eat food they do not normally eat because of the diminishing food supply.

**Production**

A warmer Arctic will also affect weather patterns and thus food production around the world. Wheat farming in Kansas, for example, would be profoundly affected by the loss of ice cover in the Arctic. Warmer winters are bad news for wheat farmers, who need freezing temperatures to grow winter wheat. And in summer, warmer days would rob Kansas soil of 10 percent of its moisture, drying out valuable cropland.



**A few places at risk**

**Bangkok, Thailand**

Thailand’s capital is sinking quickly. Experts say it may be under water in as little as seven years.

**New York**

Science Daily reports that the sea levels in the New York City area are expected to rise about twice as quickly as sea levels around the world. Not only will the Empire City be transformed into a pool, but it will also slowly be washed out to sea.

**Shanghai, China**

According to experts, not much can be done to keep Shanghai above ground, since the city is simply too heavy for its foundation. However, in an effort to slow the sinking process, all new high-rise buildings must be built with deep concrete piles to help support their weight. If you have any interest in seeing the architecture for which Shanghai is both famous and floundering, don’t wait too long.

**New Orleans, Louisiana**

It wasn’t until after Hurricane Katrina that experts really took note of New Orleans’ downhill situation. In 2006, National Geographic reported that the city sank about a quarter of an inch per year in the years leading up to Hurricane Katrina, while the levees designed to protect the city from the Gulf sank at four or five times that rate, exasperating the long-term effects of the storm. Experts say that not much can be done to save the Big Easy.

**Venice, Italy**

Preserving Venice has been a priority of the Italian Government for about 30 years. Several billion euros have been dedicated to a flood defense system, the MOSE Project, which was completed in 2012. However, some experts claim that the only way to save the city is to move it altogether. Either way, if you’ve always dreamed of a gondola ride through the Bride of the Sea, you had better do so soon.

**Mexico City, Mexico**

There are several projects underway to keep this sinking city afloat, including a 23-foot-wide ($1.1 billion) Eastern Drainage Tunnel that will deposit waste water about 40 miles north of the city. The tunnel should be completed by 2012. Work is also being done to help save the architectural gems like the popular Metropolitan Cathedral found in the Historic District, which are one of the city’s major tourist draws. But despite best efforts, engineers say that there is no way to keep Mexico City from sinking.

**The Philippines**

The water is already rising in the Philippines, not only threatening homes of people who live near the coast, but flooding rice fields and devastating other areas of agricultural production. Before only 20 percent of water from the lake and seaside overflow to the community, now it has increased to about 80 percent. It has affected farm production for rice, corn, vegetables and fruit trees.

**Barbados**

It’s not just faraway islands that Americans had never heard of before climate change started being talked about. Host of the Barbados Conference that focused on this issue back in 1994, Barbados is another of the small island nations at risk. According to UNESCO: “With populations, agricultural lands and infrastructures tending to be concentrated in the coastal zone, any rise in sea-level will have significant and profound effects on settlements, living conditions and island economies. The very survival of certain low-lying countries is threatened.”

**Egypt**

In addition to this high biophysical exposure to the risk of sea level rise, Egypt’s social sensitivity to sea level rise is particularly high. As discussed earlier in this section much of Egypt’s infrastructure and development is along the low coastal lands, and the fertile Nile delta also constitutes the prime agricultural land in Egypt.

**Solutions?**

**Can we burn anything to stop global warming?**

Yes. When we burn fossil fuels -- like oil, coal and gas -- to generate electricity and power our vehicles, we produce the heat-trapping gases that cause global warming. The more we burn, the faster churns the engine of global climate change. Thus the most important thing we can do is to save energy.

Technologies exist today to make cars that run cleaner and burn less gas, generate electricity from wind and sun, modernize power plants, and build refrigerators, air conditioners and whole buildings that use less power. As individuals, each of us can [take steps to save energy](http://www.nrdc.org/globalwarming/gsteps.asp) and fight global warming.

Although there is no single solution to global warming, the technologies and approaches outlined below are all needed to bring down the emissions of these gases by at least 80 percent by mid-century.

**To reduce melting of ice caps:**

**Revving up renewables**: Renewable energy sources such as solar, wind, geothermal and bioenergy are available around the world. Multiple studies have shown that renewable energy has the technical potential to meet the vast majority of our energy needs. Renewable technologies can be deployed quickly, are increasingly cost-effective, and create jobs while reducing pollution.

**Managing forests and agriculture**: Taken together, tropical deforestation and emissions from agriculture represent nearly 30 percent of the world's heat-trapping emissions. We can fight global warming by reducing emissions from deforestation and forest degradation and by making our food production practices more sustainable.

**Developing and deploying new technologies**: Research into and development of the next generation of low-carbon technologies will be critical to deep mid-century reductions in global emissions. Current research on battery technology, new materials for solar cells, harnessing energy from novel sources like bacteria and algae, and other innovative areas could provide important breakthroughs.

**Chasing Ice Documentary**

In the spring of 2005, acclaimed environmental photographer James Balog headed to the Arctic in order to capture images that would help tell the story of the Earth’s changing climate. He had initially been skeptical himself about earth’s changing climate, but his first trip north allowed him to realize there was a problem and sparked a challenge within him that would put his career and his well-being at risk.

Chasing Iceis the story of one man’s mission to change the tide of history by gathering undeniable evidence of our changing planet. Within months of his first trip to Iceland, Balog conceived The Extreme Ice Survey: along with his team, Balog deployed revolutionary time-lapse cameras across the Arctic to capture a multi-year record of the world’s changing glaciers.

*Chasing Ice* is now a famous documentary that shows how Balog’s desire to bring our world’s terrifying situation to the eyes of the public truly raised awareness and fear among us all.

**Fun Facts**

The Ice Caps are like the canary in the gold mine… It will tell you when it’s time to start worrying about Global Warming.

In the last 100 years, the world’s global temperature increased by ½ degree Celsius. On a global scale, it’s not easy to make the temperature rise or fall. It’s not the same as a country experiencing changes in temperatures. A 2-degree drop in temperature brought about the Ice Age between 1350 and 1850. Degrees are a big thing when we’re talking about the whole planet.

Here are some Ice Cap melting facts:

* A recent study says we can expect the oceans to rise between 2.5 and 6.5 feet by 2100
* Antarctica at the South Pole has about 90% of the world’s ice (70% of it is fresh water, our global supply).  If all this ice melted, the sea will rise by 200 feet!
* The Greenland ice sheet measures around 650,000 square miles. If all this ice melted, the sea will rise by 20 feet.
* In the last 100 years the sea level has risen by 6 to 8 inches.
* 80% of the sunlight that strikes the polar caps is reflected back out of our atmosphere. Without the ice caps, that amount of heat will be absorbed by our oceans and will cause ocean temperatures to rise. Warmer ocean temperatures will mean more frequent and more intense weather events.
* According to NASA, the polar ice caps are melting at an alarming rate of 9% per decade. The thickness of the Arctic Ice has decreased by 40% since the 1960s.
* According to scientists at the U.S Center for Atmospheric Research, if the current rate of global temperature rise continues, the Arctic will be free of Ice by 2040.
* The IPCC predicts that sea levels could rise by 10 to 23 inches by 2100.

Climate change has an economic impact as well. The cost of global warming has been estimated to around US$ 13,000 BILLION. Some estimates are even higher. The longer we wait to act the more it will cost.

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